



AQUA-ECB-1 500Nm

Operating manual

(82-20-06007 DE10)

Control for swimming pool covers :
for all drives of the AQUA series with integrated
pulse generator. (IPG)

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1. Description

The control is a processor-controlled 24 VDC reversing contactor with soft-start and soft-stop function for drives of the Aqua-IPG series. The detection of the travel way is done by sensors. The end positions are programmed, the system does not require mechanical limit switches. The programming of the end positions is carried out by the buttons on the board or optionally by means of a remote programming unit, which can be connected on the board. Further function settings can be made in a user-friendly way by means of a rotary button (S4).

The programming is protected against power failure. Additionally, the sensors are constantly monitored and the drive is protected against overload. For extra position report, potential-free contacts are provided.


2. Technical data


| | |
|----------------------|---|
| Power supply: | 230 V~, 50Hz |
| Internal fuse | 3,15A |
| Motor voltage: | 24 V DC |
| Motor current: | 20A 22A (temporary) |
| Control voltage: | 24 V DC |
| Signal relay: | changeover potential-free 230 V AC 1/10A max. |
| Ambient temperature: | 0°C tot 50°C |
| Type of protection: | IP 54 |

3. Installation information

- When connecting, the relevant standards and regulations must be observed, in particular the VDE regulations, the local EVU regulations and the accident prevention regulations.
- Before starting the installation work and with regard to subsequent work, switch the control to zero potential.
- Separate cable routing is a general principle. The sensor cable in particular must be routed separately and in a shielded cable. (Exception "Blue cable" - Integrated motor and sensor cable with shielding)
- Only one drive must be connected to the control. Voltage pick-off for on-site periphery such as light is not permitted.

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| NOTE | Ensure correct direction of rotation! The rotation direction must correspond to the buttons OPEN and CLOSE. If not: <ul style="list-style-type: none">- Interchange drive phases- Interchange sensor channel A and B |
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|  WARNING! | Danger from electric current! When connecting the control, there is the danger of an electric shock. <ul style="list-style-type: none">- Before connecting the control, it must be switched to zero potential.- Before accessing the connecting terminals, all poles of the control must be disconnected from the supply circuit. |
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|  WARNING! | Danger due to improper use! Unauthorized opening and improper intervention may lead to bodily injuries or damage to property. Allow only trained or qualified personnel (e.g. electrically skilled person) to work on the system. |
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| NOTE | In order to avoid severe bodily injuries or substantial damage to property, only qualified persons, who are familiar with the electrical drive equipment, are allowed to work on the control. Qualified persons are persons, who are familiar with set-up, installation, commissioning and operation of electrical systems and have the necessary qualifications according to their activities. They must be able to evaluate the work assigned to them, recognize potential sources of danger and take suitable safety precautions. |
|-------------|--|

4. Functionality

Rotary button and display – functionality

System states and inputs are displayed on the LEDs H1 to H10. On the two-digit segment display H20 in the right part of the board, the parameters and error messages are displayed. Numerical values with more than two digits are displayed by alternating flashing of the hundreds digit and the tens digit or the ones digit. For example, if H20 alternates between 1 and 00, this corresponds to the display of the value 100.

The rotary button S4 has two functions. By vertically pressing on the tip of the rotary button, inputs can be confirmed and the programming mode can be called up (see below). By turning the rotary button clockwise or counter-clockwise, menu items and options (e.g. drive type, operating mode, etc.) can be "browsed" in the programming mode and numeric parameters (e.g. drive speed, acceleration duration, etc.) can be increased or reduced.

Programming and parameterisation

1. **Switch on the programming mode:** Keep the rotary button S4 pressed for three seconds.
2. **Select the main menu:** By rotating the rotary button S4, set the respective numerical code of the desired menu and confirm the selection by pressing the button.
(For this, see 10. List of the menu functions!)
3. **Setting of functions:** By rotating the rotary button S4, set the numerical code of the desired option or set the desired numerical value and confirm by pressing the button. The display returns to the main menu.
4. **Exit programming mode:** By rotating the rotary button S4, set the numerical code 00 and confirm by pressing the button. The display returns to the visualization of the current operating status. If the numerical code 00 is selected in programming mode, the programming mode exits itself automatically after 15 seconds without further input.

All main menus and submenus and their associated numerical codes are listed in chapter 10 "*List of the menu functions*". Setting the numerical code and subsequently pressing the button will take you to the submenus and back.

5. Drive selection

Before use, the control must be configured with regard to the connected drive type using the menu function 01.

6. Setting of the end positions

Setting and programming of the end positions is done via the installed buttons or the optionally available remote programming unit.

1. Delete all storages and initiate programming mode:

Press the button PROG and keep it pressed. In addition, press then the OPEN and CLOSE button simultaneously. Keep the 3 buttons pressed for approx. 3 seconds, until all the LEDs positioned above the buttons are illuminated (H1–H3).

2. LED display in the programming mode: (no position is programmed)

| | |
|---------------------|--------------------------------------|
| H1 is illuminated = | OPEN position is not yet programmed |
| H2 is illuminated = | Programming is initiated |
| H3 is illuminated = | CLOSE position is not yet programmed |

3. Storage of positions:

The travel button operated first after activating the programming mode determines the order of the end position programming. If it is travelled in OPEN direction first, the OPEN end position must be programmed first, and afterwards the CLOSE position. If it is travelled in CLOSE direction first, the CLOSE end position must be stored first, and afterwards the OPEN end position. If a travel button has already been operated after activating the programming mode, but the other end position shall be stored first, the programming mode can be reset by pressing again all three buttons for 3 seconds. The order of storage is now selected again by travelling towards the desired first end position.

When programming the first position, the associated LED goes out for confirmation. After having programmed the second and last position, the control switches automatically to normal mode (H2 off). The associated LED H1 or H3 is illuminated as position report (see Normal mode / LED displays).

“OPEN” Position:

- Using the OPEN button, travel to the desired OPEN position.
- Subsequently, press the PROG button and keep it pressed.
- Press the OPEN button to store the position OPEN. Release both buttons.

“CLOSE” Position:

- Using the CLOSE button, travel to the desired CLOSE position.
- Subsequently, press the PROG button and keep it pressed.
- Press the CLOSE button to store the position CLOSE. Release both buttons.

Fine-tuning of the positions

A position already programmed can be corrected. (*Example: OPEN position*)

- a) Travel the system to OPEN position.
- b) Press the PROG button and keep it pressed.
- c) Additionally, press the OPEN button briefly (approx. 1 sec.). H2 is illuminated, programming mode is initiated. Release all buttons.
- d) Travel to the new OPEN position.
- e) Subsequently, press the PROG button and keep it pressed.
- f) Press the OPEN button in order to store the position OPEN. H1 is switched on and the OPEN position is changed. Release both buttons.
- g) After approx. 3 seconds, H2 goes out and the programming change is complete.

7. Operating mode

By Menu 04, the control must be set to the desired travel mode , 'Dead man' or automatic. In dead man`s mode, the system operates only as long as the command device is operated. In automatic mode, the system operates, after command initiation, automatically until the end positions are reached and can only be stopped by a stop command.

For each travel direction, the selection dead man/ automatic can be set separately. The setting is also transferred to the TIPP function for radio operation on the terminals X3-4 and X3-2.

8. Speed setting

The control is equipped with soft-start and soft-stop function. Thereby, the system reduces the operating speed via a settable time (ramp), shortly before reaching the end position. Analogously, acceleration takes places after command initiation. The respective parameters can be set via menu 11 to 23.

9. Normal mode

After programming has been completed, the drive travels in the desired direction by tapping the OPEN and CLOSE button. The drive can be stopped by tapping one of the two buttons again.

By operation of a command device at the input terminals X3-4 and X3-2, a sequential circuit OPEN-STOP-CLOSE-STOP-OPEN-... is performed.

The LEDs H1 and H3 show the status of the cover.

When operating the cover, the control executes the following operation sequences:

OPEN-travel from CLOSE position:

- CLOSE position: H3 on (Cover in CLOSE position)
- Command initiation OPEN command
- Cover moves in OPEN
- After the end of the travel in OPEN position, H1 is on (Cover in OPEN position)

CLOSE travel from OPEN position

- OPEN position: H1 on (Cover in OPEN position)
- Command initiation CLOSE command
- Cover moves in CLOSE
- After the end of the travel in CLOSE position, H3 is on (Cover in CLOSE position)

10. List of the menu functions

The functions listed below can be set by means of the rotary button S4. Please perform the desired menu settings before commissioning.

| Menu no. | Main menu | Submenu |
|----------|--|---|
| 01 | Drive type of the cover <i>Factory setting: 1</i> | 1: Aquamat 120 V 2: Aquamat 120 B 3: AquaJunior 120 4: Aquamat 250 5: - 6: GBM-R 250 7: Aquamat 500 8: GBM-R 500 |
| 04 | Operating mode <i>Factory setting: 4</i> | 1: Dead man in OPEN and CLOSE 2: Automatic in OPEN, dead man in CLOSE 3: Dead man in OPEN, self-holding in CLOSE 4: Automatic in OPEN and CLOSE |
| 05 | Number of sensors drive for cover <i>Factory setting: 2</i> | 1: one sensor 2: two sensors |
| 11 | Speed drive cover when opening <i>Factory setting: 100%</i> | 30 – 100% (100%) |
| 13 | Speed drive cover when closing <i>Factory setting: 100%</i> | 30 – 100% (100%) |

| Menu no. | Main menu | Submenu |
|----------|---|---|
| 21 | Acceleration ramp cover <i>Factory setting: 5 sec</i> | 1 – 25 Sec (5 sec) |
| 23 | Deceleration ramp cover <i>Factory setting: 5 sec</i> | 1 – 25 Sec (5 sec) |
| 31 | Signal relay 1 function <i>Factory setting: 1</i> | 0: Relay has no function 1: Position report OPEN 2: Position report CLOSE 3: System is travelling |
| 32 | Signal relay 2 function <i>Factory setting: 2</i> | 0: Relay has no function 1: Position report OPEN 2: Position report CLOSE 3: System is travelling |
| 33 | Running time of the cover: After expiration of the set time, the system stops. <i>Factory setting: 15 minutes</i> | 0 – 30 minutes (15 minutes) 0: Running time monitoring inactive! |
| 34 | Brake voltage cover <i>Factory setting: 60%</i> | 60 – 100% of the operating voltage (60%) |
| 41 | Emergency operation cover: Allows a movement of the drive without functioning of the sensors. (dead man mode) ATTENTION: End positions are not recognized in this operating mode. | OPEN button: OPEN travel CLOSE button: CLOSE travel |

| Menu no. | Main menu | Submenu |
|----------|---|---|
| 91 | Cycle counter | <p>Displays number of openings</p> <p>After operating the rotary button S4, 7 numbers are displayed sequentially in the right-hand segment of H20. By showing the graduation marks, it is indicated in the left-hand segment at which number you are. First graduation mark for number 1, second graduation mark for number 2 etc.. Being written sequentially, the numbers in the right-hand segment reveal the number of cycles as a numeral. Example: 0003526 for 3526 cycles.</p> |
| 92 | Display the last errors | The last 4 errors that have occurred are displayed |
| 94 | Display the firmware version | Example: 1.2 |
| 95 | Reset of the control to factory setting | Operate the OPEN button, subsequently operate the PROG button for at least 3 seconds |
| 96 | <p>Maximum motor current:</p> <p>Reset of the previous maximum current:</p> | <p>Display of the previous maximum Current.</p> <p>Operate the OPEN button, subsequently operate the PROG button for at least 3 seconds</p> |
| 00 | <i>Exit programming mode</i> | |

11. Error and information

In the event of a fault, the display outputs information on the present error. Any fault leads to an immediate stop (exception: Error no. 41). The following list shows the possible error messages:

| Error number | Error message | Remedial action |
|--------------|--|--|
| 11 | Safety circuit is interrupted | Check the connections on the terminals SK and determine the cause. |
| 21 | Short-circuit in the motor circuit | Check the motor connections for short-circuits and the cables for damage. |
| 22 | Sensor error | Check the sensor connection. Replace the sensor, if necessary. See also chapter 16 : sensor monitoring. |
| 23 | Excess voltage | Drive feeds too much energy back into the control. Install a chopper resistor. |
| 24 | Motor overload | Drive is blocked. Check the unobstructed movement of the system. In case of a freely moving system, maybe an insufficiently dimensioned drive. |
| 25 | Motor too fast | Install a chopper resistor; if necessary, check the drive type for suitability. |
| 26 | Error with regard to direction of rotation | Interchange the motor cables or the sensor cables A+B |
| 27 | Temperature of the heat sink is too high | Reduce the mechanical loading, check the motor supply cable. Check whether the motor is defective |
| 28 | Overload / speed too low | Drive is blocked. Check the unobstructed movement of the system. In case of a freely moving system, maybe an insufficiently dimensioned drive. |
| 29 | Excess current | Drive is blocked. Check the unobstructed movement of the system. In case of a freely moving system, maybe an insufficiently dimensioned drive. |

| Error number | Error message | Remedial action |
|--------------|--------------------------|--|
| 33 | Runtime error | Set the permissible running time (menu 33); determine the cause for a longer running time e.g. overload (reducing the speed) or defect in the power transmission |
| 41 | Excess voltage / warning | Install a chopper resistor; if necessary, check the drive type for suitability. The control does not switch off the drive. |

12. Protective functions

Overload protection:

When exceeding the permissible motor voltage by feeding back of the drive with regard to pulling loads, the control reduces the speed permanently, until the voltage is once again within the permissible range. (Note: When falling below the minimum speed, error 24 may occur). By using a chopper resistor, such behaviour may be eliminated.

When reaching motor voltages which may cause damage to the control, travelling is stopped (Error 23). By error 41, an advance warning is displayed.

Excess current:

In order to protect the control, a current monitor is integrated additionally. When exceeding the current limit value provided for the set drive, the control reduces the speed of the drive.

In doing so, the impermissible current consumption is reduced (if necessary) and the system is still operational. However, in case of continuing excess current (>10 sec), the control switches off (Error 29).

Speed monitoring:

The drive speed of the set drive is monitored. When falling below or exceeding the speed, the drive is switched off. The fault is displayed by the error message 24, 25 or 28.

13. Chopper resistor

Drives with low self-locking (such as e.g. tubular motors) can increase their drive speed when operating with pulling loads. For example, this can occur if the cover is installed underwater. Due to the increased speed, electrical power can be fed back into the control which may cause damage to the control. The speed and the feed-back process are monitored and, if necessary, output with an error message. By connecting a chopper resistor (27-47 Ohm, 50W, cooled) to the two contact points X7, the power fed back can be converted into heat.

14. Sensor monitoring / emergency mode function

The sensor signals are constantly evaluated and monitored for correct functioning. The LEDs H9 and H10 indicate whether the sensors operate. In proper condition, the two LEDs light up alternately (high frequenting). Note: Depending on the position of the transmitter, one of the LEDs may light up when the motor is switched off. If the sensors send out faulty or no signals, the drive is switched off and an error message is output.

In case of only one defective sensor, the system can be reset to operate with one sensor by menu 05. The functional sensor is connected to terminal A.

In doing so, the system is still operational until there is a suitable point in time for repair.

| | |
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| NOTE | End positions must be set again! |
| NOTE | <p>In case of two defective sensors, emergency mode is possible via menu 41.</p> <p>This function may cause damage to the system.</p> <p>Only under supervision, the system must be travelled into a safe state.</p> <p>Subsequently, the system must be repaired.</p> <p>After having used the emergency mode, reprogramming of the end positions is necessary.</p> |

15. Accessories

A remote programming unit is available as an accessory. This allows setting the end positions from a more favourable position. In order to use the remote programming unit, the cable of it is put on the board in the intended slot. The setting buttons OPEN-PROG-CLOSE can be found on the remote programming unit as well. During programming, only dead man travel is possible. Then, the system runs as long as the travel button is pressed. After having completed programming, the system runs according to the configuration. Stopping travelling is then possible by another command initiation using the button Open or Close (sequential circuit).

Another accessory available is a radio remote control set which can be put on the position R1. By operation of the OPEN and CLOSE button on the radio remote control, a travel in OPEN or CLOSE is triggered. When a drive is moving continually, travelling is stopped by pressing a button.